REMARKS

The Office Action dated March 26, 2004, has been received and carefully considered. In this response, claims 146-150 have been added, the claims 35, 46, 51, 56, 61, 101, 112, 117, 122, and 127 have been amended, and claims 1-34, 40-45, 65-100, 106-111, and 132-145 have been cancelled without prejudice. Entry of added claims 146-150, and the amendments to claims 35, 46, 51, 56, 61, 101, 112, 117, 122, and 127, is respectfully requested. Reconsideration of the outstanding rejections in the present application is also respectfully requested based on the following remarks.

I. THE ANTICIPATION REJECTION OF CLAIM 35

On pages 2-3 of the Office Action, claim 35 was rejected under 35 U.S.C. § 102(e) as being anticipated by Hoose (U.S. Patent No. 6,487,019). This rejection is hereby respectfully traversed.

Under 35 U.S.C. § 102, the Patent Office bears the burden of presenting at least a prima facie case of anticipation. In re Sun, 31 USPQ2d 1451, 1453 (Fed. Cir. 1993) (unpublished). Anticipation requires that a prior art reference disclose, either expressly or under the principles of inherency, each and every element of the claimed invention. Id.. "In addition, the

prior art reference must be enabling." Akzo N.V. v. U.S. International Trade Commission, 808 F.2d 1471, 1479, 1 USPQ2d 1241, 1245 (Fed. Cir. 1986), cert. denied, 482 U.S. 909 (1987). That is, the prior art reference must sufficiently describe the claimed invention so as to have placed the public in possession of it. In re Donohue, 766 F.2d 531, 533, 226 USPQ 619, 621 (Fed. Cir. 1985). "Such possession is effected if one of ordinary skill in the art could have combined the publication's description of the invention with his own knowledge to make the claimed invention." Id..

Regarding claim 35, the Examiner asserts that Hoose teaches a diffraction grating comprising: a reflective material having a blazed surface with a blaze angle between about 27 degrees and about 39 degrees; and an optically transmissive material disposed adjacent the reflective material and having an index of refraction (n) (n_{air} = 1.0), wherein the blazed surface of the reflective material has approximately (500±110)*n number of grooves per millimeter such that the diffraction grating has an efficiency of at least 80% over at least one of the C-band and L-band wavelength ranges as shown in Figure 4.

However, it is respectfully submitted that Hoose fails to disclose, or even suggest, a diffraction grating comprising: a reflective material having a blazed surface with a blaze angle

between about 27 degrees and about 39 degrees; and an optically transmissive material disposed adjacent the reflective material and having an index of refraction (n), wherein the blazed surface of the reflective material has approximately (500±110)*n number of grooves per millimeter such that the diffraction grating has an efficiency of at least 80% <u>for all polarization states</u> over at least one of the C-band and L-band wavelength ranges, as presently claimed. That is, as clearly indicated in Figure 4 of Hoose, which shows the efficiencies of a diffraction grating having 600 g/mm and a blaze angle of 28.7° for two different polarizations (i.e., S and P polarizations) approximately over the C-band (i.e., ~1520nm to ~1566nm) and L-band (i.e., ~1560nm to ~1610nm) wavelength ranges, the efficiency of at least one polarization is well below 80% over both the C-band and L-band wavelength ranges. Indeed, Hoose only discloses the ability to achieve efficiencies of at least 80% over at least one of the C-band and L-band wavelength ranges for a single polarization state (e.g., the S-polarization in Figure 4) using a single diffraction grating having 600 g/mm and a blaze angle of 28.7°, <u>but definitely not for all polarization states</u>. Furthermore, Hoose requires <u>multiple diffraction gratings</u> to achieve beneficial efficiencies for more than a single polarization state over at least one of the C-band and L-

band wavelength ranges (see Figure 7). Thus, it is respectfully submitted that Hoose fails to disclose, or even suggest, the features recited in claim 35.

In view of the foregoing, it is respectfully requested that the aforementioned anticipation rejection of claim 35 be withdrawn.

II. THE OBVIOUSNESS REJECTION OF CLAIM 101

On pages 3-4 of the Office Action, claim 101 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Hamel et al. (U.S. Patent No. 5,748,815) in view of Hoose (U.S. Patent No. 6,487,019). This rejection is hereby respectfully traversed.

As stated in MPEP § 2143, to establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. <u>In re</u>

Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). Also, as stated in MPEP § 2143.01, obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); In re Jones, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. In re Mills, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990). Further, as stated in MPEP § 2143.01, to establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). That is, "[a]ll words in a claim must be considered in judging the patentability of that claim against the prior art." In re Wilson, 424 F.2d 1382, 165 USPQ 494, 496 (CCPA 1970). Additionally, as stated in MPEP § 2141.02, a prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. W.L. Gore & Associates, Inc. v. Garlock, Inc., 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983),

cert. denied, 469 U.S. 851 (1984). Finally, if an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious. In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988).

Regarding claim 101, the Examiner asserts that Hamel et al. teaches a wavelength division device comprising: a plurality of first coupling components (72, 74, 76, 78), each first component being capable of receiving a distinct carrier for carrying a signal; a second coupling component (68) disposed adjacent the first coupling components and capable of receiving a distinct carrier for carrying one or more signals; and a diffraction grating (70) optically coupled to each carrier received by the first and second coupling components and a diffraction grating optically coupled to each carrier received by the first and second coupling components as shown in Figure 5. The Examiner then acknowledges that Hamel et al. does not teach the diffraction grating having the specific blaze angles and groove densities claimed. The Examiner then goes on to assert that Hoose teaches a diffraction grating comprising: a reflective material having a blazed surface with a blaze angle between about 27 degrees and about 39 degrees; and an optically transmissive material disposed adjacent the reflective material and having an index of refraction (n) (n_{air} = 1.0) wherein the

blazed surface of the reflective material has approximately (500±110)*n number of grooves per millimeter such that the diffraction grating has an efficiency of at least 80% over at least one of the C-band and L-band wavelength ranges as shown in Figure 4. The Examiner then concludes that it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the grating of Hoose in the device of Hamel et al. in order to improve the multiplexer performance.

However, as discussed above, it is respectfully submitted that Hoose fails to disclose, or even suggest, a diffraction grating comprising: a reflective material having a blazed surface with a blaze angle between about 27 degrees and about 39 degrees; and an optically transmissive material disposed adjacent the reflective material and having an index of refraction (n), wherein the blazed surface of the reflective material has approximately (500±110)*n number of grooves per millimeter such that the diffraction grating has an efficiency of at least 80% <u>for all polarization states</u> over at least one of the C-band and L-band wavelength ranges, as presently claimed. That is, as clearly indicated in Figure 4 of Hoose, which shows the efficiencies of a diffraction grating having 600 g/mm and a blaze angle of 28.7° for two different polarizations (i.e., S and

P polarizations) approximately over the C-band (i.e., ~1520nm to ~1566nm) and L-band (i.e., ~1560nm to ~1610nm) wavelength ranges, the efficiency of at least one polarization is well below 80% over both the C-band and L-band wavelength ranges. Indeed, Hoose only discloses the ability to achieve efficiencies of at least 80% over at least one of the C-band and L-band wavelength ranges for a single polarization state (e.g., the S-polarization in Figure 4) using a single diffraction grating having 600 g/mm and a blaze angle of 28.7°, <u>but definitely not for all polarization states</u>. Furthermore, Hoose requires <u>multiple diffraction gratings</u> to achieve beneficial efficiencies for more than a single polarization state over at least one of the C-band and L-band wavelength ranges (see Figure 7). Thus, it is respectfully submitted that Hoose fails to disclose, or even suggest, the features recited in claim 101.

In view of the foregoing, it is respectfully requested that the aforementioned obviousness rejection of claim 101 be withdrawn.

III. <u>THE OBVIOUSNESS REJECTION OF CLAIMS 37, 46, 48, 50, 51, 53, 55-58, AND 60-63</u>

On pages 4-5 of the Office Action, claims 37, 46, 48, 50, 51, 53, 55-58, and 60-63 were rejected under 35 U.S.C. § 103(a)

as being unpatentable over Hoose (U.S. Patent No. 6,487,019). This rejection is hereby respectfully traversed.

Regarding claims 46, 51, 56, and 61, the Examiner asserts that Hoose teaches a blazed diffraction grating with an optically transmissive material and having an index of refraction (n) (n_{air} = 1.0), but does not teach the claimed blaze angles and number of grooves per millimeter. The Examiner goes on to assert that it would have been obvious to one having ordinary skill in the art at the time the invention was made to vary the blaze angles and grooves per millimeter and diffraction orders in accordance with the grating equation, since it has been held that discovering an optimum value of a result effective variable (i.e., diffraction efficiency) involves only routine skill in the art, and that one would have been motivated to vary the blaze angles and grooves per millimeter and diffraction orders in accordance with the grating equation for the purpose of optimizing diffraction efficiency over the claimed wavelength ranges. In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977).

However, regarding claim 46, it is respectfully submitted that Hoose fails to disclose, or even suggest, a diffraction grating comprising: a reflective material having a blazed surface with a blaze angle between about 37 degrees and about 40

degrees; and an optically transmissive material disposed adjacent the reflective material and having an index of refraction (n), wherein the blazed surface of the reflective material has approximately (200±40)*n number of grooves per millimeter such that the diffraction grating has an efficiency of at least 60% <u>for all polarization states</u> over the C-band wavelength range, as presently claimed. Specifically, Hoose fails to teach a reflective material having a blazed surface with a blaze angle between about 37 degrees and about 40 degrees (Hoose only discloses blaze angles of 28.7 and 54 degrees); and an optically transmissive material disposed adjacent the reflective material and having an index of refraction (n), wherein the blazed surface of the reflective material has approximately (200±40)*n number of grooves per millimeter (Hoose only discloses 600 g/mm) such that the diffraction grating has an efficiency of at least 60% <u>for all polarization states</u> over the C-band wavelength range (i.e., ~1520nm to ~1566nm), as presently claimed. Furthermore, Hoose teaches that <u>multiple diffraction gratings</u> are required to achieve beneficial efficiencies for more than a single polarization state over the C-band wavelength range (see Figure 7). Thus, Hoose fails to teach the actual claimed structure of, multiple parameters of, and the overall operation of the claimed diffraction grating.

Accordingly, it is respectfully submitted that Hoose fails to disclose, or even suggest, the features recited in claim 46.

Similarly, regarding claim 51, it is respectfully submitted that Hoose fails to disclose, or even suggest, a diffraction grating comprising: a reflective material having a blazed surface with a blaze angle between about 41 degrees and about 44 degrees; and an optically transmissive material disposed adjacent the reflective material and having an index of refraction (n), wherein the blazed surface of the reflective material has approximately (450±40)*n number of grooves per millimeter such that the diffraction grating has an efficiency of at least 70% <u>for all polarization states</u> over the C-band wavelength range, as presently claimed. Specifically, Hoose fails to teach a reflective material having a blazed surface with a blaze angle between about 41 degrees and about 44 degrees (Hoose only discloses blaze angles of 28.7 and 54 degrees); and an optically transmissive material disposed adjacent the reflective material and having an index of refraction (n), wherein the blazed surface of the reflective material has approximately (450±40)*n number of grooves per millimeter (Hoose only discloses 600 g/mm) such that the diffraction grating has an efficiency of at least 70% <u>for all polarization states</u> over the C-band wavelength range (i.e., ~1520nm to ~1566nm), as

presently claimed. Furthermore, Hoose teaches that <u>multiple diffraction gratings</u> are required to achieve beneficial efficiencies for more than a single polarization state over the C-band wavelength range (see Figure 7). Thus, Hoose fails to teach the actual claimed structure of, multiple parameters of, and the overall operation of the claimed diffraction grating. Accordingly, it is respectfully submitted that Hoose fails to disclose, or even suggest, the features recited in claim 51.

Similarly, regarding claim 56, it is respectfully submitted that Hoose fails to disclose, or even suggest, a diffraction grating comprising: a reflective material having a blazed surface with a blaze angle between about 68 degrees and about 76 degrees; and an optically transmissive material disposed adjacent the reflective material and having an index of refraction (n), wherein the blazed surface of the reflective material has approximately (200±20)*n number of grooves per millimeter such that the diffraction grating has an efficiency of at least 60% <u>for all polarization states</u> over at least one of the C-band and L-band wavelength ranges, as presently claimed. Specifically, Hoose fails to teach a reflective material having a blazed surface with a blaze angle between about 68 degrees and about 76 degrees (Hoose only discloses blaze angles of 28.7 and 54 degrees); and an optically transmissive material disposed

adjacent the reflective material and having an index of refraction (n), wherein the blazed surface of the reflective material has approximately (200±20)*n number of grooves per millimeter (Hoose only discloses 600 g/mm) such that the diffraction grating has an efficiency of at least 60% for all polarization states over the C-band wavelength range (i.e., ~1520nm to ~1566nm), as presently claimed. Furthermore, Hoose teaches that multiple diffraction gratings are required to achieve beneficial efficiencies for more than a single polarization state over at least one of the C-band and L-band wavelength ranges (see Figure 7). Thus, Hoose fails to teach the actual claimed structure of, multiple parameters of, and the overall operation of the claimed diffraction grating. Accordingly, it is respectfully submitted that Hoose fails to disclose, or even suggest, the features recited in claim 56.

Similarly, regarding claim 61, it is respectfully submitted that Hoose fails to disclose, or even suggest, a diffraction grating comprising: a reflective material having a blazed surface with a blaze angle between about 50 degrees and about 56 degrees; and an optically transmissive material disposed adjacent the reflective material and having an index of refraction (n), wherein the blazed surface of the reflective material has approximately (250±30)*n number of grooves per

millimeter such that the diffraction grating has an efficiency of at least 60% for all polarization states over the C-band wavelength range, as presently claimed. Specifically, Hoose fails to teach a reflective material having a blazed surface with a blaze angle between about 50 degrees and about 56 degrees (Hoose only discloses specific blaze angles of 28.7 and 54 degrees); and an optically transmissive material disposed adjacent the reflective material and having an index of refraction (n), wherein the blazed surface of the reflective material has approximately (250±30)*n number of grooves per millimeter (Hoose only discloses 600 g/mm) such that the diffraction grating has an efficiency of at least 60% for all polarization states over the C-band wavelength range (i.e., ~1520nm to ~1566nm), as presently claimed. Furthermore, Hoose teaches that multiple diffraction gratings are required to achieve beneficial efficiencies for more than a single polarization state over the C-band wavelength range (see Figure 7). Thus, Hoose fails to teach the actual claimed structure of, multiple parameters of, and the overall operation of the claimed diffraction grating. Accordingly, it is respectfully submitted that Hoose fails to disclose, or even suggest, the features recited in claim 61.

Claims 37, 48, 50, 53, 55, 57, 58, 60, 62, and 63 are dependent upon independent claims 35, 46, 51, 56, and 61, respectively. Thus, since independent claims 35, 46, 51, 56, and 61 should be allowable as discussed above, claims 37, 48, 50, 53, 55, 57, 58, 60, 62, and 63 should also be allowable at least by virtue of their dependencies on independent claims 35, 46, 51, 56, and 61. Moreover, these claims recite additional features which are not claimed, disclosed, or even suggested by the cited references taken either alone or in combination. For example, regarding claims 37, 48, 53, 58, and 63, the Examiner acknowledges that Hoose does not teach the diffraction orders associated with the lowest losses.

In view of the foregoing, it is respectfully requested that the aforementioned obviousness rejection of claims 37, 46, 48, 50, 51, 53, 55-58, and 60-63 be withdrawn.

IV. THE OBVIOUSNESS REJECTION OF CLAIMS 49, 54, 59, AND 64

On page 5 of the Office Action, claims 49, 54, 59, and 64 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Hoose (U.S. Patent No. 6,487,019) in view of Blasiak et al. (U.S. Patent No. 6,067,197). This rejection is hereby respectfully traversed.

Regarding claims 49, 54, 59, and 64, the Examiner asserts that Hoose teaches the claimed invention, but does not teach that the reflective material is at least one of the following: gold material, aluminum material and silver material. The Examiner goes on to assert that Blasiak et al. teaches that the reflective material is aluminum as described in column 4, lines 11-15. The Examiner then goes on to assert that it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the reflective material as taught by Blasiak et al. in the device of Hoose because of the high reflectivity that these materials exhibit thus improving grating performance.

Claims 49, 54, 59, and 64 are dependent upon independent claims 46, 51, 56, and 61, respectively. Thus, since independent claims 46, 51, 56, and 61 should be allowable as discussed above, claims 49, 54, 59, and 64 should also be allowable at least by virtue of their dependencies on independent claims 49, 54, 59, and 64. Moreover, these claims recite additional features which are not claimed, disclosed, or even suggested by the cited references taken either alone or in combination. For example, neither Hoose nor Blasiak et al., nor any of the other cited references disclose gold and/or silver as diffraction grating reflective materials.

In view of the foregoing, it is respectfully requested that the aforementioned obviousness rejection of claims 49, 54, 59, and 64 be withdrawn.

V. THE OBVIOUSNESS REJECTION OF CLAIMS 36, 38, 39, 47, AND 52

On pages 5-6 of the Office Action, claims 36, 38, 39, 47, and 52 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Hoose (U.S. Patent No. 6,487,019) in view of Knop (U.S. Patent No. 4,426,130). This rejection is hereby respectfully traversed.

Regarding claims 36, 38, 39, 47 and 52, the Examiner asserts that Hoose teaches the claimed invention, but does not teach the specifically recited blaze angles and grooves per millimeter. The Examiner then asserts that it would have been obvious to one having ordinary skill in the art at the time the invention was made to vary the blaze angles and grooves per millimeter in accordance with the grating equation, since it has been held that discovering an optimum value of a result effective variable (i.e., diffraction efficiency) involves only routine skill in the art. The Examiner then goes on to assert that one would have been motivated to vary the blaze angles and grooves per millimeter and diffraction orders in accordance with the grating equation in the device of Hoose for the purpose of

optimizing diffraction efficiency over the claimed wavelength ranges. In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977).

Furthermore, the Examiner acknowledges that Hoose does not teach that the index of refraction of the optically transmissive material is between about 1.44 and about 1.64. However, the Examiner then asserts that Knop does teach that the index of refraction of the optically transmissive material is between about 1.44 and 1.64 as described in column 6, lines 23-62. The Examiner then goes on to assert that it would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the optically transmissive material of Knop having an index of refraction between about 1.44 and 1.64 in the device of Hoose in order increase the efficiency of the grating as described in column 1, lines 62-68 and column 2, lines 1-3.

Claims 36, 38, 39, 47, and 52 are dependent upon independent claims 35, 46, and 51, respectively. Thus, since independent claims 35, 46, and 51 should be allowable as discussed above, claims 36, 38, 39, 47, and 52 should also be allowable at least by virtue of their dependencies on independent claims 35, 46, and 51. Moreover, these claims recite additional features which are not claimed, disclosed, or even suggested by the cited references taken either alone or in

combination. For example, as described above with respect to claims 35, 46, and 51, Hoose fails to teach the actual claimed structure of, multiple parameters of, and the overall operation of the claimed diffraction grating. The additional features recited in claims 36, 38, 39, 47, and 52 provide further distinctions between Hoose and the claimed invention.

In view of the foregoing, it is respectfully requested that the aforementioned obviousness rejection of claims 36, 38, 39, 47, and 52 be withdrawn.

VI. <u>THE OBVIOUSNESS REJECTION OF CLAIMS 103, 112, 113, 116-118, 121-123, 125-128, 130, AND 131</u>

On pages 6-8 of the Office Action, claim 103, 112, 113, 116-118, 121-123, 125-128, 130, and 131 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Hamel et al. (U.S. Patent No. 5,748,815) in view of Hoose (U.S. Patent No. 6,487,019). This rejection is hereby respectfully traversed.

Regarding claims 112, 117, 122, and 127, the Examiner asserts that Hamel et al. teaches a wavelength division device comprising: a plurality of first coupling components (72, 74, 76, 78), each first component being capable of receiving a distinct carrier for carrying a signal; a second coupling component (68) disposed adjacent the first coupling components and capable of receiving a distinct carrier for carrying one or

more signals; and a diffraction grating (70) optically coupled to each carrier received by the first and second coupling components and a diffraction grating optically coupled to each carrier received by the first and second coupling components as shown in Figure 5. The Examiner then acknowledges that Hamel et al. does not teach a diffraction grating with the claimed blaze angles and grooves per millimeter. The Examiner then asserts that Hoose teaches a blazed diffraction grating with an optically transmissive material and having an index of refraction (n) (n_{air} = 1.0), and thus it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the grating of Hoose in the device of Hamel et al. in order to improve the multiplexer performance. The Examiner then further acknowledges that Hamel et al. in view of Hoose, while teaching the claimed invention, does not teach the claimed blaze angles and number of grooves per millimeter. The Examiner then goes on to assert that it would have been obvious to one having ordinary skill in the art at the time the invention was made to vary the blaze angles and grooves per millimeter in accordance with the grating equation, since it has been held that discovering an optimum value of a result effective variable (i.e., diffraction efficiency) involves only routine skill in the art, and that one would have

been motivated to vary the blaze angles and grooves per millimeter in accordance with the grating equation in the combination of Hamel et al. in view of Hoose for the purpose of optimizing diffraction efficiency over the claimed wavelength ranges. In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977).

However, regarding claim 112, it is respectfully submitted that Hoose fails to disclose, or even suggest, a diffraction grating comprising: a blazed reflective material having a number of grooves per millimeter and a blaze angle between about 37 degrees and about 40 degrees; and an optically transmissive material disposed adjacent the reflective material and having an index of refraction (n), wherein the number of grooves per millimeter is approximately equal to (200±40)*n such that the diffraction grating has an efficiency of at least 60% for all polarization states over the C-band wavelength range, as presently claimed. Specifically, Hoose fails to teach a blazed reflective material having a number of grooves per millimeter and a blaze angle between about 37 degrees and about 40 degrees (Hoose only discloses blaze angles of 28.7 and 54 degrees); and an optically transmissive material disposed adjacent the reflective material and having an index of refraction (n), wherein the number of grooves per millimeter is approximately equal to (200±40)*n (Hoose only discloses 600 g/mm) such that the

diffraction grating has an efficiency of at least 60% <u>for all polarization states</u> over the C-band wavelength range (i.e., ~1520nm to ~1566nm), as presently claimed. Furthermore, Hoose teaches that <u>multiple diffraction gratings</u> are required to achieve beneficial efficiencies for more than a single polarization state over the C-band wavelength range (see Figure 7). Thus, Hoose fails to teach the actual claimed structure of, multiple parameters of, and the overall operation of the claimed diffraction grating. Accordingly, it is respectfully submitted that the combination of Hamel et al. and Hoose fails to disclose, or even suggest, the features recited in claim 112.

Similarly, regarding claim 117, it is respectfully submitted that Hoose fails to disclose, or even suggest, a diffraction grating comprising: a blazed reflective material having a number of grooves per millimeter and a blaze angle between about 41 degrees and about 44 degrees; and an optically transmissive material disposed adjacent the reflective material and having an index of refraction (n), wherein the number of grooves per millimeter is approximately equal to (450±40)*n such that the diffraction grating has an efficiency of at least 70% <u>for all polarization states</u> over the C-band wavelength range, as presently claimed. Specifically, Hoose fails to teach a blazed reflective material having a number of grooves per millimeter

and a blaze angle between about 41 degrees and about 44 degrees (Hoose only discloses blaze angles of 28.7 and 54 degrees); and an optically transmissive material disposed adjacent the reflective material and having an index of refraction (n), wherein the number of grooves per millimeter is approximately equal to (450±40)*n (Hoose only discloses 600 g/mm) such that the diffraction grating has an efficiency of at least 70% <u>for all polarization states</u> over the C-band wavelength range (i.e., ~1520nm to ~1566nm), as presently claimed. Furthermore, Hoose teaches that <u>multiple diffraction gratings</u> are required to achieve beneficial efficiencies for more than a single polarization state over the C-band wavelength range (see Figure 7). Thus, Hoose fails to teach the actual claimed structure of, multiple parameters of, and the overall operation of the claimed diffraction grating. Accordingly, it is respectfully submitted that the combination of Hamel et al. and Hoose fails to disclose, or even suggest, the features recited in claim 117.

Similarly, regarding claim 122, it is respectfully submitted that Hoose fails to disclose, or even suggest, a diffraction grating comprising: a blazed reflective material having a number of grooves per millimeter and a blaze angle between about 68 degrees and about 76 degrees; and an optically transmissive material disposed adjacent the reflective material

and having an index of refraction (n), wherein the number of grooves per millimeter is approximately equal to (200±20)*n such that the diffraction grating has an efficiency of at least 60% <u>for all polarization states</u> over at least one of the C-band and L-band wavelength ranges, as presently claimed. Specifically, Hoose fails to teach a blazed reflective material having a number of grooves per millimeter and a blaze angle between about 68 degrees and about 76 degrees (Hoose only discloses blaze angles of 28.7 and 54 degrees); and an optically transmissive material disposed adjacent the reflective material and having an index of refraction (n), wherein the number of grooves per millimeter is approximately equal to (200±20)*n (Hoose only discloses 600 g/mm) such that the diffraction grating has an efficiency of at least 60% <u>for all polarization states</u> over the C-band wavelength range (i.e., ~1520nm to ~1566nm), as presently claimed. Furthermore, Hoose teaches that <u>multiple diffraction gratings</u> are required to achieve beneficial efficiencies for more than a single polarization state over at least one of the C-band and L-band wavelength ranges (see Figure 7). Thus, Hoose fails to teach the actual claimed structure of, multiple parameters of, and the overall operation of the claimed diffraction grating. Accordingly, it is respectfully submitted

that the combination of Hamel et al. and Hoose fails to disclose, or even suggest, the features recited in claim 122.

Similarly, regarding claim 127, it is respectfully submitted that Hoose fails to disclose, or even suggest, a diffraction grating comprising: a blazed reflective material having a number of grooves per millimeter and a blaze angle between about 50 degrees and about 56 degrees; and an optically transmissive material disposed adjacent the reflective material and having an index of refraction (n), wherein the number of grooves per millimeter is approximately equal to (250±30)*n such that the diffraction grating has an efficiency of at least 60% <u>for all polarization states</u> over the C-band wavelength range, as presently claimed. Specifically, Hoose fails to teach a blazed reflective material having a number of grooves per millimeter and a blaze angle between about 50 degrees and about 56 degrees (Hoose only discloses specific blaze angles of 28.7 and 54 degrees); and an optically transmissive material disposed adjacent the reflective material and having an index of refraction (n), wherein the number of grooves per millimeter is approximately equal to (250±30)*n (Hoose only discloses 600 g/mm) such that the diffraction grating has an efficiency of at least 60% <u>for all polarization states</u> over the C-band wavelength range (i.e., ~1520nm to ~1566nm), as presently claimed. Furthermore,

Hoose teaches that multiple diffraction gratings are required to achieve beneficial efficiencies for more than a single polarization state over the C-band wavelength range (see Figure 7). Thus, Hoose fails to teach the actual claimed structure of, multiple parameters of, and the overall operation of the claimed diffraction grating. Accordingly, it is respectfully submitted that the combination of Hamel et al. and Hoose fails to disclose, or even suggest, the features recited in claim 127.

Claims 103, 113, 116, 118, 121, 123, 125, 126, 128, 130, and 131 are dependent upon independent claims 101, 112, 117, 122, and 127, respectively. Thus, since independent claims 101, 112, 117, 122, and 127 should be allowable as discussed above, claims 103, 113, 116, 118, 121, 123, 125, 126, 128, 130, and 131 should also be allowable at least by virtue of their dependencies on independent claims 101, 112, 117, 122, and 127. Moreover, these claims recite additional features which are not claimed, disclosed, or even suggested by the cited references taken either alone or in combination. For example, regarding claims 103, 113, 118, 123, and 128, the Examiner acknowledges that Hoose does not teach the diffraction orders associated with the lowest losses.

In view of the foregoing, it is respectfully requested that the aforementioned obviousness rejection of claims 103, 112, 113, 116-118, 121-123, 125-128, 130, and 131 be withdrawn.

VII. THE OBVIOUSNESS REJECTION OF CLAIMS 114, 119, 124, AND 129

On page 8 of the Office Action, claims 114, 119, 124, and 129 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Hamel et al. (U.S. Patent No. 5,748,815) in view of Hoose (U.S. Patent No. 6,487,019) in view of Blasiak et al. (U.S. Patent No. 6,067,197). This rejection is hereby respectfully traversed.

Regarding claims 114, 119, 124, and 129, the Examiner asserts that Hamel et al. in view of Hoose teaches the claimed invention, but does not teach that the reflective material is at least one of the following: gold material, aluminum material and silver material. The Examiner goes on to assert that Blasiak et al. teaches that the reflective material is aluminum as described in column 4, lines 11-15. The Examiner then goes on to assert that it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the reflective material as taught by Blasiak et al. in the combination of Hamel et al. in view of Hoose because of the high

reflectivity that these materials exhibit thus improving grating performance.

Claims 114, 119, 124, and 129 are dependent upon independent claims 112, 117, 122, and 127, respectively. Thus, since independent claims 112, 117, 122, and 127 should be allowable as discussed above, claims 114, 119, 124, and 129 should also be allowable at least by virtue of their dependencies on independent claims 112, 117, 122, and 127. Moreover, these claims recite additional features which are not claimed, disclosed, or even suggested by the cited references taken either alone or in combination. For example, neither Hamel et al. nor Hoose nor Blasiak et al., nor any of the other cited references, disclose gold and/or silver as diffraction grating reflective materials.

In view of the foregoing, it is respectfully requested that the aforementioned obviousness rejection of claims 114, 119, 124, and 129 be withdrawn.

VIII. THE OBVIOUSNESS REJECTION OF CLAIMS 102, 104, 105, 115, AND 120

On pages 9-10 of the Office Action, claims 102, 104, 105, 115, and 120 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Hamel et al. (U.S. Patent No. 5,748,815) in view of Hoose (U.S. Patent No. 6,487,019) in view of Knop (U.S.

Patent No. 4,426,130). This rejection is hereby respectfully traversed.

Regarding claims 102, 104, 105, 115, and 120, the Examiner asserts that Hamel et al. in view of Hoose teaches the claimed invention, but does not teach the specifically recited blaze angles and grooves per millimeter. The Examiner then asserts that it would have been obvious to one having ordinary skill in the art at the time the invention was made to vary the blaze angles and grooves per millimeter in accordance with the grating equation, since it has been held that discovering an optimum value of a result effective variable (i.e., diffraction efficiency) involves only routine skill in the art. The Examiner goes on to assert that one would have been motivated to vary the blaze angles and grooves per millimeter and diffraction orders in accordance with the grating equation in the combination of Hamel et al. in view of Hoose for the purpose of optimizing diffraction efficiency over the claimed wavelength ranges. <u>In re Antonie</u>, 559 F.2d 618, 195 USPQ 6 (CCPA 1977).

Furthermore, the Examiner acknowledges that Hamel et al. in view of Hoose does not teach that the index of refraction of the optically transmissive material is between about 1.44 and about 1.64. However, the Examiner then asserts that Knop does teach that the index of refraction of the optically transmissive

material is between about 1.44 and 1.64 as described in column 6, lines 23-62. The Examiner then goes on to assert that it would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the optically transmissive material of Knop having an index of refraction between about 1.44 and 1.64 in the combination of Hamel et al. in view of Hoose in order increase the efficiency of the grating as described in column 1, lines 62-68 and column 2, lines 1-3.

Claims 102, 104, 105, 115, and 120 are dependent upon independent claims 101, 112, and 117, respectively. Thus, since independent claims 101, 112, and 117 should be allowable as discussed above, claims 102, 104, 105, 115, and 120 should also be allowable at least by virtue of their dependencies on independent claims 101, 112, and 117. Moreover, these claims recite additional features which are not claimed, disclosed, or even suggested by the cited references taken either alone or in combination. For example, as described above with respect to claims 101, 112, and 117, Hoose fails to teach the actual claimed structure of, multiple parameters of, and the overall operation of the claimed diffraction grating. The additional features recited in claims 102, 104, 105, 115, and 120 provide further distinctions between Hoose and the claimed invention.

In view of the foregoing, it is respectfully requested that the aforementioned obviousness rejection of claims 102, 104, 105, 115, and 120 be withdrawn.

IX. CONCLUSION

In view of the foregoing, it is respectfully submitted that the present application is in condition for allowance, and an early indication of the same is courteously solicited. The Examiner is respectfully requested to contact the undersigned by telephone at the below listed telephone number, in order to expedite resolution of any issues and to expedite passage of the present application to issue, if any comments, questions, or suggestions arise in connection with the present application.

To the extent necessary, a petition for an extension of time under 37 CFR § 1.136 is hereby made.

Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 50-0206, and please credit any excess fees to the same deposit account.

Respectfully submitted,

Hunton & Williams LLP

By: ______________________
Thomas E. Anderson
Registration No. 37,063

TEA/vrp

Hunton & Williams LLP
1900 K Street, N.W.
Washington, D.C. 20006-1109
Telephone: (202) 955-1500
Facsimile: (202) 778-2201

Date: June 28, 2004